

NON-PUBLIC?: N  
ACCESSION #: 9005080001  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: South Texas, Unit 1 PAGE: 1 OF 04

DOCKET NUMBER: 05000498

TITLE: Reactor Trip on Low Steam Generator Level Due to a Feedwater  
Booster Pump Trip  
EVENT DATE: 03/29/90 LER #: 90-005-00 REPORT DATE: 05/02/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: Charles Ayala - Supervising TELEPHONE: (512) 972-8628  
Licensing Engineer

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

#### ABSTRACT:

On March 29, 1990, Unit 1 was in Mode 1 at 100 percent power. At approximately 1443 hours, Feedwater Booster Pump (FBP) 11 tripped upon actuation of a ground fault relay. The standby pump, FBP 13, automatically started; but did not deliver sufficient flow to prevent Steam Generator Feedwater Pump 12 from tripping on low suction pressure. Attempts to maintain steam generator level were unsuccessful and the reactor tripped on low steam generator level. The plant was brought to a stable shutdown in Mode 3. The cause of the FBP 11 trip has not yet been identified; however, it is believed that a weakness of the FBP 11 windings or feeder cables aggravated by moisture intrusion and dirt due to clogged air inlet filters resulted in the ground fault. Corrective action is being taken to disassemble, inspect and clean the FBP 11 motor during the current refueling outage. The preventive maintenance activity to inspect the pump motor has been revised to periodically inspect and

clean the cooling air filters. Backup FBP 13 did not provide adequate flow because the recirculation valve had been manually set in the open position until the valve controller could be repaired. Repair to the FBP 13 recirculation valve controller will be completed during the current refueling outage.

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END OF ABSTRACT

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#### DESCRIPTION OF EVENT:

On March 29, 1990, Unit 1 was in Mode 1 at 100 percent power. At approximately 1443 hours, Feedwater Booster Pump (FBP) 11 tripped upon actuation of a ground fault relay. The standby pump, FBP 13, automatically started; however, its recirculation valve was open resulting in reduced flow. Steam Generator Feedwater Pump 12 subsequently tripped on low suction pressure. Control room operators attempted to maintain steam generator level by reducing turbine load while an operator was dispatched to close the FBP 13 recirculation valve. Before the FBP 13 recirculation valve could be closed, the reactor tripped on low steam generator level. A feedwater isolation signal was generated as expected on low average reactor coolant system temperature; however, the Train A and D Feedwater Isolation Valves failed to close immediately. The Train A valve went to an intermediate position, and subsequently closed after about two minutes and the Train D valve closed after approximately 5 minutes. All other safety systems performed as required and the plant was brought to a stable shutdown in Mode 3. The NRC was notified of this event at 1741 hours. Based upon initial troubleshooting of the Feedwater Isolation Valves, the decision was made to begin the scheduled Unit 1 refueling outage approximately one week early.

At the time of the trip a heavy rainstorm was in progress. This pump has tripped previously during rainstorms. As a result of these events, troubleshooting was performed and corrective action was taken to prevent recurrence. Troubleshooting included checks of the circuitry and cables for the pump motor and corrective actions taken included sealing of the junction boxes and cable terminations to prevent moisture intrusion. Following a pump trip in October of 1989, troubleshooting identified a failed insulator which was believed to have caused the ground faults

Following replacement of the insulator, the pump ran satisfactorily and was believed to be fully repaired.

Following the March 29th event, inspections were conducted on the motor connection box. Traces of moisture were found, but not enough to have caused a ground fault. The insulators and surge capacitors were inspected, tested, and found to be in good condition. The motor feeder cables were meggered and a polarization index and winding analysis was performed on the motor with satisfactory results. The ground fault relay was tested and scheme checked and the current transformer was inspected. No deficiencies were noted.

The pump motor end covers were opened for an internal inspection. The four inlet air filters were found to be severely dirty and approximately 50 percent clogged. Oil, dirt and water were found at the bottom and on the walls of the air chamber. Oil and dirt were found on the motor internals, including the stator windings. The location of the ground fault was not found; however, it is believed that the dirty conditions combined with moisture which was drawn into the motor due to the clogged filters aggravated an existing weakness in the motor winding insulation resulting in the ground fault.

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#### DESCRIPTION OF EVENT: (Cont'd.)

Both South Texas units are designed to tolerate a single FBP failure without a trip. However, in this case, the Unit 1 recirculation valve controller associated with FBP 13 was inoperable pending receipt of repair parts. Since the recirculation valve had been left in the open position for pump protection, and the controller was inoperable, closure of the valve could not be accomplished in time to prevent loss of suction pressure to the main Steam Generator Feedwater Pumps.

#### CAUSE OF EVENT:

The reactor trip was initiated by the tripping of FBP 11 and failure of the backup FBP 13 to provide sufficient feedwater flow to the main Steam Generator Feedwater Pumps. The most probable cause of the FBP 11 trip was a defect or weakness in the FBP 11 motor windings or feeder cable insulation which periodically results in a ground fault. This condition may have been aggravated by clogged inlet air filters which caused moisture and dirt to be drawn into the motor.

The FBP 13 bypass valve failed to close automatically due to a controller which was inoperable pending receipt of repair parts.

The cause of the Feedwater Isolation Valves failure to close was the breakdown of the hydraulic fluid under high temperature. A further discussion of the feedwater isolation valves is included in a 10CFR21 report submitted to the NRC under HL&P letter number ST-HL-AE-3430 dated April 11, 1990.

#### ANALYSIS OF EVENT

An unplanned reactor trip is reportable pursuant to 10CFR50.73(A)(2)(iv). During this event the reactor was brought to a stable shutdown in Mode 3. Other than the delayed closing of the Train A and D Feedwater Isolation Valves, there were no unexpected post trip transients.

#### CORRECTIVE ACTION:

The following corrective actions are being taken as a result of this event:

1. The inlet air filters on the Feedwater Booster Pumps will be inspected and cleaned prior to completion of the current Unit 1 refueling outage.

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#### CORRECTIVE ACTION: (Cont'd.)

2. The Feedwater Booster Pump 11 Motor will be disassembled, inspected and cleaned prior to startup from the current Unit 1 refueling outage.
3. The preventive maintenance activity to inspect the Feedwater Booster Pumps has been revised to include inspection and cleaning of the intake air filters.
4. The Feedwater Booster Pump 13 recirculation valve controller will be repaired prior to startup from the current refueling outage.

#### ADDITIONAL INFORMATION

There have been no previous events reported regarding a reactor trip due to failure of a feedwater booster pump.

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ATTACHMENT 1 TO 9005080001 PAGE 1 OF 2

The Light  
company South Texas Project Electric Generating Station  
Houston Lighting & Power P.O. Box 289 Wadsworth, Texas 77483

May 2, 1990  
ST-HL-AE-3449  
File No.: G26  
10CFR50.73

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555

South Texas Project Electric Generating Station  
Unit 1  
Docket No. STN 50-498  
Licensee Event Report 90-005 Regarding a Reactor Trip on Low  
Steam Generator Level Due to a Feedwater Booster Pump Trip

Pursuant to 10CFR50.73, Houston Lighting & Power Company (HL&P)  
submits the attached Licensee Event Report (LER 90-005) regarding reactor  
trip on low steam generator level due to a feedwater booster pump trip.  
This event did not have any adverse impact on the health and safety of  
the public.

If you should have any questions on this matter, please contact Mr.  
C.A. Ayala at (512) 972-8628 or myself at (512) 972-7921.

G.E. Vaughn  
Vice President  
Nuclear Generation

BEM/nl

Attachment: LER 90-005 (South Texas, Unit 1)

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A Subsidiary of Houston Industries Incorporated

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ST-HL-AE-3449

Houston Lighting & Power Company File No.: G26  
South Texas Project Electric Generating Station Page 2

cc:

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Revised 12/15/89

L4/NRC/

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